



Duke Power Company
A Duke Energy Company

Catawba Nuclear Station
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July 24, 1996

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Subject: Catawba Nuclear Station
Docket No. 50-414
LER 414/97-005

Gentlemen:

Attached is Licensee Event Report Unit Two Reactor Trip On 2B Reactor Coolant Pump Lo Flow.

This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

Gary R. Peterson
Site Vice President

Attachment

cc: Mr. L.A. Réyes
Administrator, Region II
U.S. Nuclear Regulatory Commission
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NRC Resident Inspector
Catawba Nuclear Station

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CATEGORY 1

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9708040137 DOC.DATE: 97/06/09 NOTARIZED: NO
FACIL:50-414 Catawba Nuclear Station, Unit 2, Duke Power Co.
AUTH.NAME AUTHOR AFFILIATION
BIRCH,M.L. Duke Power Co.
PETERSON,G.R. Duke Power Co.
RECIP.NAME RECIPIENT AFFILIATION

DOCKET #
05000414

SUBJECT: LER 97-005-00: on 970626, automatic reactor trip occurred while in Mode 1. Caused by equipment failure of Cutler-Hammer E30JY5 close/trip push button switch. Maint & engineering found & replaced defective switch. W/970724 ltr.

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LICENSEE EVENT REPORT (LER)

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TITLE (4)

Unit Two Reactor Trip On 2B Reactor Coolant Pump Lo Flow

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER(S)
06	26	97	97	005	00	06	09	97	N/A	

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR (Check one or more of the following) (11)																					
POWER LEVEL (10)	100	20.402(b)	20.405(a)(1)(i)	20.405(a)(1)(ii)	20.405(a)(1)(iii)	20.405(a)(1)(iv)	20.405(a)(1)(v)	20.405(c)	50.36(c)(1)	50.36(c)(2)	50.73(a)(2)(i)	50.73(a)(2)(ii)	50.73(a)(2)(iii)	X	50.73(a)(2)(iv)	50.73(a)(2)(v)	50.73(a)(2)(vi)	50.73(a)(2)(vii)(A)	50.73(a)(2)(vii)(B)	50.73(a)(2)(x)	73.71(b)	73.71(c)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)

LICENSEE CONTACT FOR THIS LER (12)

NAME		TELEPHONE NUMBER	
		AREA CODE	
M. L. Birch, Safety Assurance Group Manager		(803)	831-3310

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
N	EI	JS	C770	NO					

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE)		X	NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e. approximately fifteen single-space typewritten lines) (16)

Unit Status: Unit 2- mode 1, power operation, 100% power.

Event Description: On June 26, 1997, an automatic reactor trip occurred while in mode 1. While searching for an electrical ground, the reactor coolant pump lost power when its associated bus isolated. Bus isolation and the loss of the reactor coolant pump resulted in low flow in one loop of the reactor coolant system and subsequent automatic trip of the reactor. A faulty push button caused the electrical ground.

Root Cause: The root cause of the reactor trip was equipment failure of a Cutler-Hammer E30JY5 close/trip push button switch.

Corrective Action: Maintenance and Engineering found and replaced the defective switch. The failed switch has been sent to Duke Power Testing Lab to determine cause of failure. Engineering will evaluate the results of the testing and determine any additional corrective actions necessary.

NRC FORM 366A 89)		U.S. NUCLEAR REGULATORY COMMISSION(6-		APPROVED OMB NO. 3150-0104 EXPIRES:5/31/95	
LICENSEE EVENT REPORT (LER) TEXT CONTINUATION				ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503	
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BACKGROUND:

The Reactor Coolant System (NC) [EIIS:AB] consists of four similar heat transfer loops connected in parallel to the reactor pressure vessel [EIIS:RPV]. Each loop contains a reactor [EIIS:RCT] coolant pump (NCP) [EIIS:P], steam generator [EIIS:SG] and associated piping and valves [EIIS:V].

The 6900 Volts Alternating Current (VAC) Normal Auxiliary Power System [EIIS:EA] distributes power to unit auxiliaries required during normal operation and serves as the preferred power supply to the 4160VAC [EIIS:EB] Essential Auxiliary Power System.

The 6900 volt system consists of four switchgear [EIIS:SWGR] assemblies, designated 2TA, 2TB, 2TC, and 2TD, which are of the split-bus design. Each switchgear powers one NCP. The two sections of each switchgear assembly are supplied from separate unit auxiliary transformers [EIIS:XFMR]. Each split-bus tie breaker [EIIS:52] is interlocked with its associated incoming feeder breakers to prevent the sustained paralleling of two unit auxiliary transformers. During normal operation (i.e., both incoming breakers to each bus section closed and the split-bus tie breaker open), should one of the two normal sources to a 6900 volt switchgear assembly be lost, an automatic transfer scheme will trip the appropriate incoming breaker and close the tie breaker. This transfer will allow the entire switchgear assembly to be supplied from the remaining source. A transfer will not be made if a ground is detected on the bus that lost power, the tie breaker will be locked out. If the two sources are in-sync, a fast transfer will be made with a nominal dead-bus time of 130 milliseconds. If the two sources are out-of-sync, a residual voltage relay scheme is used to delay the transfer until the residual voltage decays to 25% or less. No automatic transfer is initiated upon a protective trip on the load side of a normal incoming breaker.

Each 6900/600V transformer feeder breaker is furnished with an instantaneous ground relay (50G) [EIIS:50] and an instantaneous/time delay overcurrent relay (50/51) [EIIS:51]. Operation of either relay will trip its associated breaker, but will not block the close circuit.

An auxiliary relay (94B) [EIIS:94] is provided in the trip circuit of the 6900/600V transformer feeder breaker that is designed to operate when any one of the lockout, overcurrent or ground relays associated with the breaker, operates for protective purposes. When the auxiliary relay is operated, a contact from the relay will close to energize a time delay relay

**LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION**

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(62BA or 62BB) [EIIS:62] in the switchgear breaker failure circuit. If the main protective relays fail to trip the feeder breaker, the auxiliary relay will remain activated while the time delay relay (62BA or 62BB) completes its timing cycle. When relay 62BA or 62BB picks up, contacts from the relay will close to operate the switchgear incoming breaker lockout relay 86NA1 or 86NB1 [EIIS:86]. This relay will trip and lock out the associated incoming breaker and the tie breaker, and isolate the 6900V feeder breaker fault.

Cutler-Hammer type E30 push button and indicating light switches [EIIS:JS] are used to manually close or trip each of the breakers in the 6900 volt system. The push button has two button operators with dual indicating lights and has a momentary action.

Control Distribution Center 2CDB is the 125 Volts Direct Current (VDC) power [EIIS:EI] source for the control circuitry for breaker 2TB-6.

EVENT DESCRIPTION:

June 26, 1997

Maintenance technicians searched for a ground in the 125VDC control power system to breaker 2TB-6 that feeds shared transformer 2STXB. Maintenance requested Operations to rack out breaker 2TB-6 to further investigate the ground.

~1800 hours

Operations tripped breaker 2TB-6. The breaker was racked out and for the next hour Maintenance and the system engineer were trouble shooting the breaker to find the ground. They were not working in cabinet during this time.

1908 hours

Auxiliary relay (94B) picked up and tripped the feeder breaker, 2TB-5, to the bus. 2B NCP tripped followed by Unit 2 reactor trip. The unit was placed in a stable shutdown condition.

Maintenance and the system engineer determined that the ground was not in the breaker. The ground/undervoltage detection cubicle was visually checked to verify which leg of 2CDB was grounded. At this point, it was observed that the positive leg was grounded.

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CONCLUSIONS:

The root cause of the reactor trip was equipment failure of a Cutler-Hammer E30JY5 close/trip push button switch.

Maintenance was investigating a ground fault in the 2CDB system that was caused by a short in an E30 switch in the circuitry. The investigation required the removal of breaker 2TB-6 from service. When breaker 2TB-6 was subsequently tripped via the E30 push button, the trip contacts stuck closed creating a fault path through the positive leg on 2CDB and an electrical path through the 94B relay in the circuit. Voltage induction on the cables leading to the 94B relay caused the relay to pick up and close the contact to timer relay 62BB. In turn relay 86NB1 was picked up. Relay 86NB1 tripped and locked out the associated incoming breaker and the tie breaker, completely de-energizing 2TB short side bus. This resulted in loss of power to 2B reactor coolant pump. Unit 2 reactor subsequently tripped on reactor coolant low flow.

There are no NPRDS reportable equipment failures associated with this event.

A review of the Operating Experience Data Base (OEDB) for the last 24 months found 2 reactor trips due to equipment failure. Each equipment failure was of different type equipment. A review was made for E30JY5 Cutler-Hammer switches and no failures of this type switch was found. The corrective actions taken with the previous reactor trips would not have prevented the current trip. The cause of this reactor trip is considered not recurring.

CORRECTIVE ACTIONS:

IMMEDIATE:

Operations initiated the following procedures. EP/2/A/5000/E-0 to verify proper response of the automatic protective systems and EP/2/A/5000/ES-0.1 to stabilize and control the plant following a reactor trip without Safety Injection.

SUBSEQUENT:

Maintenance and Engineering found and replaced the defective switch. Work was performed under WO# 97054211-01. The failed switch has been sent to Duke Power Testing Lab to determine cause of failure.

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PLANNED:

Engineering will evaluate the results of the testing and determine any additional corrective actions necessary.

SAFETY ANALYSIS:

The automatic reactor trip while in mode 1, was caused by low flow in one loop of the reactor coolant system due to the loss of the reactor coolant pump in that loop. This trip is bounded by discussions contained in chapter 15, section 3.1.2, of the Updated Final Safety Analysis Report (UFSAR). All systems responded as expected to maintain the reactor in a safe shutdown condition.

The health and safety of the public were not affected by this event.